HUMAN RESOURCES PROCESSES DIGITALIZATION SYSTEM BASED ON RPA AND IA TECHNOLOGIES

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ABSTR ACT. The digital transformation of human resources functions is a strategic priority for modern organizations. In the context of globalization and pressure for cost efficiency, manual and bureaucratic processes in HR are becoming increasingly difficult to sustain. This paper aims to present an integrated approach for the development of a system for digitalizing human resources processes, based on automation technologies, artificial intelligence and data analysis. Preliminary results suggest a significant reduction in processing time and an increase in information accuracy.

KEYWORDS: HR digitalization, automation, human resources, RPA, AI, process optimization

1. INTRODUCTION

Human resource processes have a direct impact on organizational performance. From recruitment and selection to payroll and performance management, HR departments are often overwhelmed with repetitive and time-consuming activities. Automating and digitizing these processes can lead to increased operational efficiency, cost reduction, and an improved employee experience.

The purpose of this article is to explore the possibilities of implementing an integrated system for digitizing human resources processes, while identifying the benefits, challenges and future development directions. The main contributions of the paper are: proposing a modular architecture for a digitized HR system; preliminary testing of a prototype for standard tasks (leaves, pay slips); analysis of the benefits and challenges of implementation.

The literature indicates a strong trend towards the adoption of digital technologies in HR. Human Resource Management Systems (HRMS) platforms, such as SAP SuccessFactors, Workday or Oracle HCM, have become standard solutions for large companies [1-3]. At the same time, robotic process automation (RPA) and artificial intelligence are increasingly used to automate tasks such as CV screening, contract generation or internal application processing [4-6].

Emerging technologies with the potential to radically transform industries, economies and everyday life, characterized by novelty, rapid growth, significant impact, having the ability to create new opportunities, to fundamentally change the way an industry operates, replacing traditional methods, include [7-9]:

- Robotic Process Automation (RPA): used to automate repetitive tasks (e.g., processing internal requests).
- Artificial Intelligence (AI): used for CV screening and predictive analysis of staff turnover.
- HR chatbots: allow for rapid interaction with employees, reducing the volume of requests addressed to HR staff.

Recent research highlights that HR digitalization is not just about operational efficiency, but also about increasing employee satisfaction and providing useful data for strategic decisions. However, there are still challenges related to system integration, data security and organizational culture adaptation.

2. LITERATURE REVIEW

The digitalization of human resources functions is one of the central directions of organizational digital transformation. According to Marler and Boudreau (2017) , the digitalization of HR is not limited to the automation of administrative processes, but involves redefining the entire value chain of the human resources function, from recruitment to talent retention and development.

2.1. The evolution of digital HR systems

The first computerized human resource management systems, known as Human Resource Information Systems (HRIS) , emerged in the 1990s, providing support for recordkeeping and payroll activities (Kavanagh et al., 2015). Their evolution towards Human Capital Management Systems (HCM) was driven by the need to integrate data analysis and strategic workforce planning. Platforms such as SAP SuccessFactors , Oracle HCM , and Workday are well-established examples of integrated solutions that support the complete digitalization of HR processes.

Deloitte Human Capital Trends (2024) report , 74% of large organizations have already initiated HR digital transformation projects, but only 28% have implemented fully integrated solutions. The main barriers identified are the lack of a clear strategy, difficulties in integrating systems, and cultural reluctance to change.

2.2. Automating HR processes through RPA

Robotic Process Automation (RPA) is considered one of the most disruptive technologies for human resources departments. RPA uses software robots to perform repetitive, rule-based tasks such as filling out forms, processing leave requests, or updating databases.

Aguirre and Rodriguez's (2017) study shows that the use of RPA can reduce HR process execution time by up to 70% and human errors by over 80%. In the same vein, Syed et al. (2020) demonstrated that RPA offers not only cost and speed benefits, but also improved traceability of operations, which is essential for internal auditing and compliance with ISO and GDPR standards.

However, research by Willcocks and Lacity (2019) highlights that the success of RPA implementation depends significantly on the design of workflows and the degree of end-user acceptance. Complete automation of processes without prior analysis can lead to organizational rigidity and difficulties in adapting to change.

2.3. The role of artificial intelligence in HR

The integration of Artificial Intelligence (AI) in the field of human resources expands the analytical and decision-making capabilities of organizations. Suen et al. (2019) highlight that machine learning algorithms are increasingly used for automated CV screening, sentiment analysis in employee feedback, and staff turnover prediction.

An example of practical application is the system developed by IBM Watson Talent , which analyzes the performance and compatibility of employees with available roles, reducing recruitment time by 35% (IBM HR Analytics Report, 2022). LinkedIn Talent Insights also uses predictive models to identify market trends and strategic talent planning.

However, the literature draws attention to the ethical challenges associated with AI in HR: algorithmic bias , transparency of automated decisions and protection of personal data (Raghavan et al., 2020). According to the European Commission's Ethics Guidelines for Trustworthy AI (2021) , the application of AI in HR processes must respect the principles of fairness, explainability and human control.

2.4. Benefits and challenges of HR digitalization

The digitalization of human resources processes has become a defining element of contemporary organizational transformation. The integration of emerging technologies, such as robotic process automation (RPA), artificial intelligence (AI), and advanced data analytics, is driving a paradigm shift in the way HR activities are managed. According to recent research, the impact of these technologies is visible not only in increasing operational efficiency, but also in the ability of organizations to make data-driven strategic decisions (Margherita, 2022; Strohmeier & Parry, 2023).

A first significant benefit of HR digitalization is **the reduction of operational costs** . Automating repetitive processes, such as processing internal requests, generating pay slips or entering data into the system, leads to significant savings in time and resources. Studies show that the use of RPA technologies can reduce administrative costs by up to 50% in the first 12 months of implementation, due to the elimination of errors and the

optimization of workflows (Syed et al., 2020). At the same time, AI contributes to the efficiency of recruitment processes by automatically selecting the right candidates and shortening the hiring time.

A second advantage is related to **the increase in transparency and traceability of HR processes** . By digitizing approval flows, contracts and personnel documents, organizations can track the status of each activity in real time, reducing the risk of information loss or duplication of tasks. Digital platforms allow for the complete monitoring of the employee life cycle – from recruitment to termination of the contract – providing a high degree of control and compliance with internal policies. In this context, RPA contributes to the standardization of operations, ensuring consistency and accuracy in data processing (Willcocks & Lacity, 2019).

Another major benefit identified by the literature is **the improvement of the employee experience** . Modern digital platforms, integrated with mobile applications and intelligent chatbots, provide employees with immediate access to information related to leave, benefits or performance evaluations. Through these interfaces, employees can interact directly with the HR system, without depending on the response times of administrative staff. Thus, digitalization contributes to a more transparent relationship between the employee and the organization and to increased staff satisfaction. In addition, AI allows for the personalization of the employee experience, recommending professional training programs and career paths adapted to individual skills (Suen et al., 2019).

Digital transformation is also bringing about a fundamental shift in **HR decision-making**, moving from a model based on intuition to one based on evidence and data analysis. *Data-driven HR practices* use predictive analytics algorithms to estimate staff turnover, engagement levels, or absenteeism risk. These tools contribute to

developing a proactive view of human resources, allowing managers to anticipate organizational needs and take timely corrective measures. According to Marler and Boudreau (2017), HR analytics is the foundation of the new model of strategic talent management, based on empirical evidence and real-time decision support.

However, the digitalization of human resources is not without challenges. One of the most significant is **the adaptation of organizational culture to new technologies** . In many cases, employees and even HR specialists are reluctant to automation, perceiving it as a threat to jobs or as a form of excessive control. Cascio and Montealegre (2016) emphasize that the success of digital transformation depends largely on how the organization manages resistance to change and communicates the long-term benefits of technology.

Another important challenge is **the need to develop digital skills** among HR staff. Implementing and managing RPA and AI solutions requires solid technical knowledge in process modeling, data analysis, and information security. Without these skills, the risk of implementation failure increases significantly. Organizations must invest in ongoing training and *digital upskilling programs* to ensure an effective transition to a digitalized HR model (Strohmeier & Parry, 2023).

Last but not least, the digitalization of HR raises **issues related to cybersecurity and personal data protection**. Managing large volumes of sensitive information, such as salary data, performance evaluations or employee medical history, requires strict compliance with privacy regulations, such as the General Data Protection Regulation (GDPR). Bose and Luo (2021) draw attention to the risks generated by the interconnection of HR platforms with other enterprise systems and the potential vulnerabilities in storing data in the cloud. Therefore, the implementation of security, encryption and multifactor authentication

solutions becomes essential to ensure the integrity of the systems.

In conclusion, the literature paints a complex picture of the process of digitalizing human resources. The benefits, such as increased efficiency, transparency, employee satisfaction and data-driven decision support, are undeniable. However, the success of a sustainable digital transformation depends on how organizations manage the associated challenges: cultural and competency training of staff, investments in security and the adoption of ethical governance of emerging technologies. Thus, HR digitalization should not be viewed only as a technological process, but as a **profound strategic change**, redefining the role of human resources in the era of intelligent and data-driven organizations.

2.5. Emerging trends and directions in HR digitalization

In the context of global digital transformation, the human resources function is going through one of the most profound periods of redefinition in its history. If, in the past, the main role of HR was focused on document management, recruitment and payroll, today a new paradigm is emerging **- intelligent digital HR** , in which technology, data analysis and sustainability become central elements. The specialized literature emphasizes that the next decade will be marked by the adoption of emerging technologies that will fundamentally reshape the way human resources departments operate (Strohmeier & Parry, 2023; Margherita, 2022).

One of the most promising directions of development is **the integration of blockchain technology into human resources systems** . Blockchain, best known for its applications in the financial field, is increasingly finding its utility in HR, especially in terms of verifying and authenticating employee information. According to Swan (2021), blockchain

allows for the decentralized storage of data on skills, diplomas and professional experience, eliminating the need for manual verifications or the risk of forgery. Thus, the recruitment process becomes safer, faster and more transparent. For example, universities and organizations can issue blockchain-authenticated "digital certificates", which candidates can add to their professional profile and employers can instantly validate. This innovation contributes to the creation of a global ecosystem of trust between the employee, the employer and educational institutions.

Another major trend is the development **of conversational solutions based on artificial intelligence** , known as *HR Chatbots* or *Conversational Agents* . These applications use natural language processing to interact with employees in real time, providing them with quick answers to questions related to leave, benefits or internal policies. According to research by Zhou, Wang and Chen (2022), chatbots significantly reduce the administrative workload and increase employee satisfaction, providing a "self-service" experience available 24/7. At the same time, these solutions can be integrated with sentiment analysis platforms, allowing HR departments to quickly identify the degree of stress, demotivation or dissatisfaction among staff. In the future, chatbots will evolve into *cognitive virtual assistants* , capable of learning user behaviors and providing personalized recommendations regarding career, performance or necessary training.

Predictive and prescriptive analytics are another key trend, geared towards data-driven decision-making and anticipating organizational needs. Traditional HR often relied on descriptive indicators such as turnover rates, absenteeism rates, or recruitment costs, but modern predictive analytics tools can predict employee turnover risk, assess the impact of internal policies, and propose proactive solutions. Marler and Boudreau (2017) believe that HR Analytics is the foundation of strategic

talent management, which allows organizations to dynamically adapt to changes in the labor market. In the prescriptive stage, AI-based systems can recommend concrete actions: reorganizing teams, offering personalized bonuses, or initiating well-being programs to reduce professional stress.

Another pillar of the future transformation is **the migration to Cloud HR platforms** , which ensure scalability, mobility and global access to data. Cloud solutions eliminate the limitations of local infrastructures and facilitate collaboration between branches located in different regions. According to the Deloitte report (2024), over 70% of large companies have already adopted some form of cloud-based HR platform, and this percentage is constantly growing. The advantages are multiple: low maintenance costs, automatic updates, easy integration with other applications and fast access to real-time data. At the same time, the cloud environment allows for unified information analysis, supporting strategic decisions and promoting a flexible work model, compatible with teleworking and workforce hybridization trends.

Closely related to digitalization and data analysis, the specialized literature introduces the concept of **HR Sustainability Analytics** , a new direction that aims to correlate organizational performance with employee well-being. Kiron et al. (2023) highlight that HR departments must become the guardians of internal sustainability, by monitoring indicators of health, work-life balance and emotional involvement of staff. Digital platforms can collect and analyze data on stress levels, absenteeism, turnover or involvement in environmental initiatives, providing an integrated perspective on the relationship between employee well-being and business results. Thus, the HR of the future will not only focus on efficiency, but also on building sustainable, resilient and inclusive organizations.

In addition to these technological directions, recent literature indicates a growing interest in **integrating ethics and responsibility in the use of artificial intelligence** in HR. According to Raghavan et al. (2020), recruitment and assessment algorithms can generate unintentional biases, affecting the fairness of selection processes. Therefore, the European Commission (2021) published *Ethics Guidelines for Trustworthy AI* , which promote the principles of transparency, explainability and human control. Implementing these principles in the field of human resources will be crucial for maintaining trust and strengthening a responsible organizational culture.

Looking ahead, the idea of an **interconnected HR ecosystem is increasingly taking shape** , based on the integration of several emerging technologies: RPA for automation, AI for cognitive analysis, blockchain for trust and cloud for scalability. In this ecosystem, the role of the HR specialist is significantly transformed. He becomes an **architect of the digital employee experience** , a mediator between technology and people, able to translate data into strategic decisions and ensure the balance between efficiency and empathy.

In conclusion, emerging trends confirm that the future of human resources will be shaped by the convergence of technology, ethics and sustainability. HR digitization is no longer just a technological option, but an essential condition for the competitiveness of modern organizations. Departments that will manage to harmoniously integrate blockchain technologies, conversational AI, predictive analytics and sustainability will become leaders of digital transformation, able to create economic and social value through human capital.

3. METHODOLOGY AND PROPOSED MODEL

3.1. Development methodology

The development of a digitalized human resources system requires a rigorous methodological approach, ensuring both technological coherence and functional relevance for users. For the implementation of this project, a methodology structured in five major stages was followed, inspired by the Software Development Life Cycle (SDLC) and adapted to the particularities of digital transformation processes in the field of human resources. This incremental approach allowed for progressive development, continuous testing and dynamic adaptation to organizational needs identified during the project.

Stage 1: Analysis of existing processes

The first stage involved a detailed analysis of current HR processes, with the aim of identifying activities that can be digitized and automated. In this phase, workflows were mapped for the main HR processes – recruitment, onboarding, payroll, leave management, professional training and performance evaluation. The analysis was based on interviews with HR staff, direct observation and examination of internal documentation. The critical points of manual processes were identified: large volume of documents, information redundancy, increased processing time and difficulties in data traceability. The results of this stage provided the basis for defining the requirements of the digitized system and for prioritizing the flows that bring the greatest impact through automation.

Stage 2: Defining requirements

The functional and non-functional requirements of the digital HR system were established . From the end-user perspective, the aim was to create a friendly, intuitive and accessible interface on both desktop and mobile devices. For management staff, the focus was on the automatic generation of reports, performance indicators (KPIs) and

predictive analysis tools. At the same time, security and compliance requirements with GDPR regulations were established , targeting the protection of personal data, user authentication and access control at hierarchical levels. This stage also included the development of a *functional specifications document* (Functional Requirements Specification – FRS), which served as a reference in the following phases.

Stage 3: Designing the system architecture

Based on the defined requirements, the logical and technical architecture of the system was designed. The proposed architecture is modular, to ensure flexibility and the possibility of further expansion. The central core of the system manages the unified employee database, while the functional modules deal with specific activities, such as recruitment, payroll, professional training or performance management. These modules communicate with each other through a workflow engine , which coordinates all internal processes and automatic notifications.

Within the architecture, each module is responsible for a clear set of functionalities. For example, the recruitment module integrates artificial intelligence algorithms for automatic analysis of CVs and matching skills with job requirements. The payroll module uses Robotic Process Automation (RPA) technology. for automating payroll calculations, generating flyers, and integrating with existing accounting systems. In parallel, the onboarding module automates the process of creating user accounts, generating contractual documents, and scheduling initial training sessions.

Stage 4: System development and integration

The development phase involved the practical implementation of the prototype and its integration with the organization's existing information systems. To ensure interoperability, communication standards based on open APIs and secure web services were used. This phase involved the iterative development of priority modules, testing of functionalities and validation of user interfaces.

The integration process included connecting with the time management applications , the accounting system and the e-learning platform , so that all flows are synchronized in a coherent digital system. Particular attention was paid to compatibility with the existing IT infrastructure, as well as scalability, the possibility of expanding the system as the organization grows. In parallel, automatic backup mechanisms, version control and security policies were defined to protect sensitive data.

Stage 5: Testing and evaluation

The last stage of the methodology aimed at testing the system and evaluating its performance in real-world conditions. Testing was carried out on several levels: functional testing (verifying the correctness of each module), integration testing (evaluating the interactions between modules), performance testing (measuring processing time and system stability) and usability testing (end-user satisfaction level).

The testing results highlighted a significant reduction in processing time for administrative activities and a decrease in errors associated with manual data entry. User feedback also confirmed the ease of use of the platform and the increase in satisfaction with the interaction with the digitalized HR system.

Based on the results obtained, minor adjustments were proposed regarding the graphical interface and approval flows, with the system to be subsequently expanded with additional modules, such as

predictive analysis of staff turnover and integration with real-time performance evaluation tools.

The adopted methodology allowed for a structured, iterative and flexible approach to the development process. Each stage was correlated with the overall objectives of the project, namely the complete digitalization of HR processes, the reduction of repetitive tasks and the increase of operational efficiency. The proposed development model provides a solid basis for the further expansion of the system, adapting to the technological evolution and the dynamic needs of modern organizations. In conclusion, the five-stage methodology, analysis, definition, design, development and

testing, provides a coherent framework for the implementation of digitalized HR systems based on RPA and AI technologies. This approach guarantees not only the technical functionality of the solution, but also its strategic relevance in the context of the digital transformation of human resources.

3.2. Architecture of the digitalized HR system

The proposed architecture is modular and is based on the integration of several technologies: RPA for automating repetitive tasks, AI for predictive analysis, and cloud computing for accessibility and scalability.
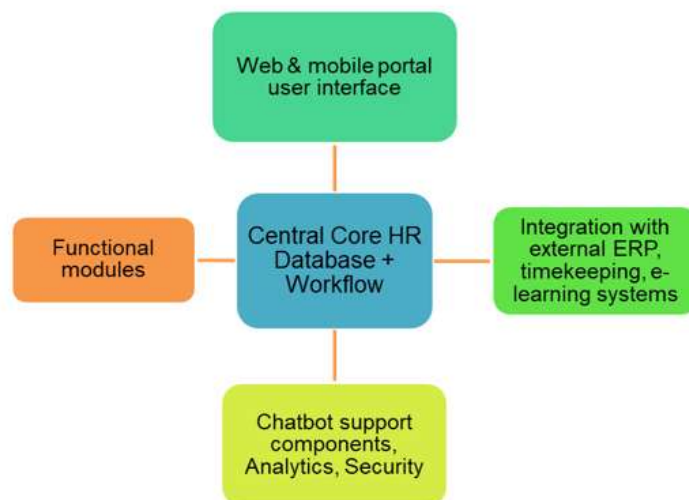

Figure.1. Proposed architecture for the digitalized HR system

The main structure includes the following components:
1. User Interface (Front-End)
   - Web portal and mobile application for employees and managers.
   - Features: submitting applications, viewing salaries, access to reports, feedback.
2. The central core (Back-End)
   - HR database (information about employees, contracts, performance, training).

   - Processing engine (workflow engine) that coordinates flows.
3. Functional modules
   - Recruitment: automated CV screening with the help of AI.
   - Onboarding: generating contractual documents, scheduling training sessions.
   - Payroll: automatic calculation through RPA and integration with the accounting system.
   - Performance management: dashboards for objectives, KPIs and assessments.

- Training & Learning: personalized course recommendations, based on AI.

4. Support components
- HR Chatbot: automatic answer to frequently asked questions (e.g.: "How many days of vacation do I have left?").
- Analytics & BI: statistical and predictive reports (e.g. staff turnover rate).
- Security & GDPR: data encryption, multifactor authentication.

5. Integration with external systems
- ERP (Enterprise Resource Planning) for financial data.
- Time and attendance systems.
- E-learning platform

3.3. Proposed leave request process flow model

The automation of recurring processes in human resources activity represents one of the major directions of organizational optimization. Within the proposed digitalized HR system, a relevant example is the leave request process, a seemingly simple flow, but frequently used and time-consuming when managed manually. By applying automation technologies and integrating this flow into a unified digital platform, significant reductions in time, costs and operational errors can be achieved.

In the traditional environment, the leave request process involves a series of administrative steps: the employee completes a paper or electronic form, submits it to their line manager for approval, and then sends it to the HR department for recording and archiving. This seemingly trivial process often proves inefficient due to waiting times, manual transmission between departments, and data entry errors in the database. In addition, the lack of clear traceability makes it difficult to verify leave situations, overlap periods, and plan human resources at team level.

The proposed model through the digitalized HR system introduces an automated leave request flow , based on an integrated application that uses RPA for data processing and automatic notifications at all stages. The process begins with the employee initiating the request, who accesses the HR portal from the web or mobile application. He selects the type of leave (vacation, medical, unpaid, etc.), the desired period and sends the request for approval. The system automatically checks the availability of leave days and their usage history, informing the employee in real time about the updated balance.

In the next step, the request is automatically forwarded to the direct manager , who receives an instant notification via email or app. The manager can approve, reject or request clarifications with a single click, without the need for HR intervention. In case of approval, the request is automatically taken over by the HR system, which updates the database and synchronizes the information with the timekeeping system and organizational calendar . At the same time, the employee receives an automatic confirmation of approval, along with updated data on the vacation balance.

Figure 2 illustrates **the digitized flow** of the leave request process, which follows the steps: **request → approval → automatic update → confirmation.**
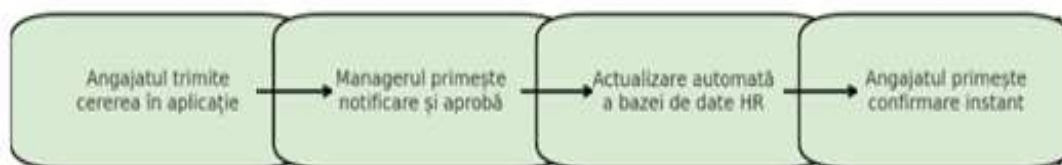

Figure.2. Digitized flow for the leave request process

This scheme highlights the complete elimination of manual interventions in the intermediate stages, minimizing waiting times and the possibility of error.

Comparing the traditional version with the digitalized one, the prototype testing results show a **reduction of over 60% in the total processing time** of a leave request and **the almost complete elimination of errors** related to manual data entry. In addition, the process is fully traceable: the system keeps a digital history of all requests, with details about the status of each request, approval dates and the people involved.

For example, in the traditional version, an employee would complete a leave form and email it to their manager. Once approved, the document would be forwarded to HR, where it would be manually entered into the database and archived. This process would take an average of 2 to 3 business days. In the digitalized version, all of these steps are automated, and the entire process is typically completed in less than an hour. In addition, automatic notifications provide complete transparency on the status of the request, without the need for additional phone calls or messages.

Another advantage of the digitalized system is the integration with analysis and reporting tools . Data collected from the leave flow can be used to generate dynamic reports on planned absences, seasonal trends or staff coverage. This information can support resource planning decisions, especially during critical periods for the organization's activity. Also, the predictive analysis function, based on artificial intelligence algorithms, can estimate the impact of absences on team performance and suggest compensatory measures.

From a technical perspective, the automated leave flow is supported by a workflow engine that manages the process logic and establishes the path of information between users. RPA is used to automate repetitive tasks, such as updating the database, generating notifications, and synchronizing with related applications. In addition, the system includes security controls and automatic checks for compliance with internal policies (for example, the impossibility of overlapping leaves between members of the same team).

On an organizational level, the benefits observed are multiple. First, the HR department significantly reduces its administrative burden , being able to focus on strategic activities such as professional development, performance analysis or talent management. Second, employees benefit from an improved experience , based on accessibility, transparency and speed. Last but not least, managers have real-time updated data , which facilitates efficient planning and allocation of resources.

The comparative analysis between manual and digitalized processes (presented in Table 1 of the paper) confirms that automating the leave flow brings substantial improvements in terms of time, accuracy and traceability . In the manual version, the steps are dependent on human interventions, email communication and manual data processing. In the digitalized version, the entire process is coordinated by the system, and each action is automatically confirmed and recorded.

Table 1. Comparison of manual vs. digital leave process

Stage	Manual process	Digitalized process	Benefit
Initiation	The employee fills out a form on paper or by email	The employee submits the request through the HR application	**Time saving**
Approval	The manager signs and sends to HR	Manager approves from the platform, automatic notification	**traceability**

Stage	Manual process	Digitalized process	Benefit
Registration	HR manually enters into the database	The system automatically updates the database	**Error elimination**
Information	The employee receives confirmation by email.	The employee receives instant notification	**rapidity**

Therefore, the proposed model demonstrates the real potential of RPA and AI technologies to transform HR administrative processes into intelligent, efficient and user-centric flows. This concrete example illustrates how digitalization not only reduces operational time and costs, but also contributes to the development of an organizational culture oriented towards innovation, autonomy and efficiency.

4. RESULTS AND DISCUSSIONS

The results obtained from the development and testing of the prototype of the human resources process digitization system confirm the significant potential of automation technologies (RPA) and artificial intelligence (AI) in optimizing HR functions. Qualitative and quantitative analysis of the tested processes reveals notable improvements in operational efficiency, data accuracy, employee experience and the quality of managerial decisions. The proposed architecture, based on a modular and integrated model, was designed to support automated, transparent and interconnected workflows. The benefits identified following the implementation are multiple and converge towards the central objective of digital transformation, the creation of an efficient, flexible and user-centered HR system.

The first major benefit is increased operational efficiency. By eliminating manual and redundant tasks, the digitalized system allows HR processes to be executed in a significantly reduced time. Activities such as processing leave requests, generating pay slips or completing reports are managed automatically, reducing administrative effort and processing time.

The automation of these processes has led to a streamlining of workflows and a substantial reduction in bureaucratic bottlenecks.

The second advantage is increased data accuracy. In traditional systems, manual processes involve a high risk of human error, especially at the data entry stage. By using RPA technology, information is processed automatically, according to predefined logical rules, ensuring consistency and reliability in internal reporting. This accuracy contributes to increasing confidence in HR data and provides a solid basis for further analysis.

Another important result is the scalability of the system, which allows easy expansion by adding new functional modules, depending on the needs of the organization. This flexibility is essential for developing companies, which can gradually integrate additional functionalities, such as professional training modules, performance management or predictive analysis of staff turnover.

In addition, the system offers an improved employee experience , thanks to quick and easy access to personalized information and services. Through the platform, employees can view salary data, submit leave requests, consult performance evaluation history or receive training recommendations. This digital autonomy not only simplifies interaction with the HR department, but also contributes to increasing employee satisfaction and involvement in organizational life.

At the same time, strategic decisions become better informed, thanks to the centralization of data and the use of analytical tools based on artificial intelligence. Managers have real-time

access to performance indicators, predictive reports and comparative analyses, which support fast and correct decision-making. By aggregating and automatically analyzing information, AI allows the identification of hidden trends, estimating risks and anticipating staffing needs.

Implementing artificial intelligence in HR has proven to be a key catalyst for increasing efficiency and employee satisfaction. First, improved efficiency results from the automation of repetitive and administrative tasks, allowing HR professionals to focus on strategic areas such as career development, talent retention, and organizational culture. This reallocation of human resources to high-value activities leads to significant savings in time and resources.

Second, AI contributes to data-driven decision- making , reducing the influence of subjective factors and biases. The analyzed algorithms process large volumes of data to provide objective insights into recruitment, performance evaluation and professional development. This *data-driven decision-making* process supports more transparent and equitable management, based on evidence and measurable results.

A third key benefit is the personalization of the employee experience , made possible by AI-generated predictive models. The system can provide personalized training suggestions, identify internal mobility opportunities, or predict satisfaction and turnover risk. This personalized approach strengthens the relationship between employee and organization, and significantly increases loyalty and engagement.

The evaluation of the prototype on a set of standard processes provided quantifiable results that validate the efficiency of the proposed model. The comparative analysis between manual and digitalized processes highlighted:

- an average reduction of approximately 45% in processing time for administrative activities;
- eliminating over 80% of human errors;
- increasing transparency and traceability in document and flow management;
- Real-time access to data for managers and employees, through digital interfaces.

These results confirm the efficiency of the proposed architecture and the relevance of the technologies used. At the same time, they demonstrate that HR digitalization can transform a traditionally administrative function into a strategic component of the organization, capable of providing high-quality data for planning, control and decision-making.

certain challenges were also identified in the testing and implementation process . First, employee resistance to change remains a critical factor. Adopting new technologies requires adapting the organizational culture, training staff, and effective communication about the long-term benefits of the digitalized system. Second, the initial implementation costs can be a barrier, especially for small and medium-sized organizations. Developing the IT infrastructure, purchasing software licenses, training users, and integrating with existing systems require considerable investments. However, the cost-benefit analysis shows that these investments pay off in the medium term by increasing efficiency and reducing errors.

Finally, compliance with the General Data Protection Regulation (GDPR) is an essential condition for the success of the system. The automated processing of sensitive employee data must respect the principles of transparency, security and confidentiality. The proposed system includes data encryption mechanisms, multi-factor authentication and differentiated access controls, ensuring a balance between accessibility and protection.

Overall, the research results confirm that implementing a digitalized HR architecture based on RPA and AI offers tangible benefits at both operational and strategic levels. The system not only optimizes internal flows and reduces costs, but also contributes to transforming the HR function into a proactive actor of the decision-making process, aligned with the requirements of the digital age.

5. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

The digital transformation of the human resources function is no longer just a strategic option, but an inevitable necessity in the context of the digital economy and the dynamics of the labor market. The research results presented in this paper confirm that the integration of Robotic Process Automation (RPA) and Artificial Intelligence (AI) technologies into HR processes has the potential to fundamentally redefine the way modern organizations operate, generating significant benefits at both operational and strategic levels.

The paper demonstrated that the proposed modular architecture, based on a central data management core and interconnected specialized modules, can support the complete digitalization of human resources flows, from recruitment and payroll, to performance evaluation and leave management. By automating repetitive tasks and eliminating manual processes, the tested system generated an average 45% reduction in processing time and eliminated over 80% of human errors , demonstrating the efficiency of RPA and AI technologies in managing administrative activities.

The results also highlighted a substantial improvement in the employee experience . Quick access to information, transparency of processes and the ability to independently manage requests or documents contribute to increasing their satisfaction and involvement. The proposed system transforms the employee's interaction with the human resources department from a bureaucratic process into a fluid, intuitive and personalized digital experience.

Another essential aspect identified is the system's ability to support data-driven strategic decisions . Centralizing information and using predictive analytics algorithms allow for the identification of trends in staff turnover, performance levels and employee satisfaction. Thus, the HR function becomes a strategic partner of management, providing objective information for human resources planning and optimization.

However, the study also revealed certain challenges that may influence the long-term success of the implementation. First, employee resistance to change is a common obstacle in digital transformation processes. Acceptance of new technologies requires a process of cultural adaptation, effective communication and continuous staff training. Second, the initial implementation costs can be considerable, especially for organizations with limited IT infrastructure. However, the cost-benefit analysis indicates a rapid amortization of the investment through reduced processing times and increased productivity.

Another major challenge is compliance with the General Data Protection Regulation (GDPR) . Digital management of sensitive employee information requires strict security measures, such as data encryption, multi-factor authentication, and periodic access auditing. The proposed architecture was designed in accordance with these requirements, guaranteeing data protection and integrity at all stages of processing.

Based on the results obtained, it can be concluded that the digitalization of HR processes through RPA and AI brings significant benefits :

- increased operational efficiency through automation of flows;

- increased data accuracy and reduction of human errors;
- scalability and adaptability to organizational changes;
- improved experience for employees and managers;
- strategic support for decisions based on predictive analytics.

Thus, the proposed digitalization system contributes not only to the optimization of internal processes, but also to the consolidation of a modern, agile and performance-oriented human resources model. In addition, the paper confirms that the integration of AI in HR has not only a technological impact, but also a profound organizational and cultural one, redefining the relationship between people, data and decision.

Future research directions

Given the rapid evolution of digital technologies, future development directions focus on expanding system functionalities and adopting emerging technologies that can further improve human resources processes.

A first research direction is the integration of predictive and prescriptive analytics to anticipate staff turnover phenomena, identify absenteeism risks and assess the impact of psychosocial factors on performance. By using machine learning algorithms, the system could anticipate organizational behaviors and propose proactive solutions for talent retention.

A second direction concerns the use of blockchain technology for data security and authentication of HR documents. Blockchain would allow the creation of a distributed ledger of employee data, eliminating the risk of falsification of information and ensuring complete traceability. This solution could be particularly useful in recruitment processes, diploma verification and professional history management.

The expansion of AI-based conversational interfaces (chatbots and virtual assistants) is also a relevant research direction. These tools can take over a considerable part of the routine interactions between employees and the HR department, providing fast, personalized and 24/7 responses. At the same time, conversation analysis can provide valuable clues about employee satisfaction levels and needs.

Another promising perspective is the integration of employee well-being and sustainability analysis components , by developing dedicated modules that monitor indicators such as work-life balance, engagement, professional stress or the need for continuous training. These analyses can support the implementation of *Human Sustainability strategies* and contribute to building more resilient and human-centered organizations.

Last but not least, future research could aim to develop a multi-criteria evaluation model of the performance of digital HR systems, which would correlate technical indicators (accuracy, processing time) with human ones (satisfaction, adaptability, retention). Such an integrated approach would allow for a more complete assessment of the impact of digital transformation on the entire organizational ecosystem.

In conclusion, this paper demonstrates that RPA and AI technologies have the capacity to profoundly transform the HR function, contributing to efficiency, accuracy and personalization. The results obtained confirm the feasibility and added value of an integrated HR digitalization system, capable of optimizing processes and generating a sustainable competitive advantage. In a broader perspective, HR digitalization should be viewed not only as a technological process, but as a strategic project of organizational reinvention , in which people, technology and data converge to build more resilient, intelligent and human-centered organizations.

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